pending in this application.

1. **Rejection of claims 1-14 under 35 U.S.C. §103(a)**

The Office Action rejects claim 1-14 under 35 U.S.C. §1032(a) as being unpatentable over U.S. Patent 3,475,369 ("Blunt") in view of either U.S. Patent 3,328,362 ("Roberts et al.") or U.S. Patent 5,252,677 ("Tomita et al."). The Office Action states:

> [Blunt] exhibits a crystallinity of no more than 90% (N.B. column 1 line 16), column 2 line 29 and especially column 3 lines 3-10 (and especially lines 3-6)); and (3) containing a molar percentage of higher olefin (i.e., second or co-monomer) less than about 25 or 13 m/o (depending upon the type of copolymer - N.B. column 3 line 71 thru column 4 line 4 and especially column 4 lines 1-4), such that all of the polymer properties and characteristics envisioned and claimed are seen to be documented and satisfied; while (B) Roberts et al. and Tomita et al. are (again) seen to fairly and clearly disclose that it is known to improve (i.e. render superior, in the manner envisioned by applicants) the properties (e.g. adhesiveness etc.) of olefin copolymers of the type documented in Blunt via the functionalization thereof i.e. by the incorporation (e.g. by grafting) of a polar monomer into the (preformed) copolymer, which foregoing documented (and

expected) beneficial function and result are seen to (1) constitute evidence of the obviousness of the (or a) claimed invention (In re Skoner 186 USPQ 80); and (2) provide both (more than) sufficient (a) motivation or suggestion to those of ordinary skill in this art to make the reference combination and art rejection proposed by the Examiner (as set forth in In re Fielder et al. 176 USPQ 300); and (b) basis for the required reasonable expectation of success (as set forth in In re Clinton 188 USPQ 365); further, each of these respective patentees are seen to fairly indicate the amount or extent of modification required (and as claimed by applicants) to reflect the aforementioned improved adhesion property viz. N.B. column 1 line 66 thru column 2 line 4 (and especially column 2 lines 2-4), column 2 lines 11-14 and column 4 lines 51-55 of Roberts et al. and N.B. column 9 lines 40-46 of Tomita et al.; and (c) with the foregoing art rejection, it is the sum total of the teachings of the applied, combined references taken as a whole which is seen to render applicants' invention obvious to one of ordinary skill in this art (In re McLaughlin 170 USPQ 209), and therefore applicants' piecemeal attack of the references individually cannot establish unobviousness, since this rejection is based upon a combination of references (In re Mapelsden 141 USPQ 30) i.e. this rejection is not overcome by pointing out that one reference does not contain a particular teaching when the reliance for that teaching was on another reference (In re Lyons, 155 USPQ 741); further, the Examiner is well aware that the proper criterion under 35 U.S.C. §103 is obviousness and not "obvious to try" and indeed the art rejection statement has been so worded.

Applicants respectfully traverse this rejection because the Office Action fails to establish all three prongs necessary for a *prima facie* case of obviousness. Applicants reiterate yet again that none of the cited references alone or in combination teach or suggest to one of ordinary skill in the art the presently claimed limitations of:

1. a copolymer containing components derived from ethylene and an α-olefin of 6 to 20 carbon atoms, wherein

   the content of the ethylene component is in the range of 75 to 97% by mol, and

   the content of the α-olefin component is in the range of 3 to 25% by mol;

2. the crystallinity as measured by X-ray diffractometry is less than 30%; and

3. the copolymer contains a graft component derived from a polar monomer.

One of ordinary skill in the art simply would not have had any motivation or suggestion to make the particularly claimed limitations based upon the teachings of the cited art.

Turning to the rule, the Federal Circuit held that a *prima facie* case of obviousness must establish: (1) some suggestion or motivation to modify the references; (2) a reasonable

expectation of success; and (3) that the prior art references teach or suggest all claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

A *prima facie* case of obviousness must also include a showing of the reasons why it would be obvious to modify the references to produce the present invention. See Ex parte Clapp, 277 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). The Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings. Id. at 974.

In the present application, claim 1 recites a resin dispersion comprising:

(a) a copolymer containing components derived from ethylene and an α-olefin of 6 to 20 carbon atoms, the content of the ethylene component is in the range of 75 to 97% by mol, and the content of the α-olefin component is in the range of 3 to 25% by mol, each content being based on 100% by mol of the total of both components,

(b) the intrinsic viscosity (η) as measured in decalin at 135°C is in the range of 0.2 to 5.0 dl/g,

(c) the crystallinity as measured by X-ray diffractometry is less than 30%, and

(d) the copolymer contains a graft component derived from a polar monomer, and the content of the polar monomer graft component is in the range of 0.1 to 15% by weight.

As stated supra, nowhere do the cited references teach each and every limitation contained within sub-parts (a), (c) and (d) of the independent claims. In particular, the cited references fail to teach the molar ranges for the ethylene and the α-olefin component, crystallinity properties of the ethylene polymer and the eventual graft modification of the polymer product. Although the Office Action notes that a reference disclosure is not limited to its specific illustrative examples, Applicants note that this holding does not extend to non-existent teachings. While teachings that are disclosed as non-preferred can be used to establish the *prima facie* case, they must still first be disclosed. Clearly, the cited references are completely silent as to the limitations at issue.

In particular, Blunt teaches absolutely nothing about the specific molar ratio of the ethylene component to the α-olefin

component in the copolymer. Although Blunt may encompass in a very broad sense ethylene/C_{6-20} copolymers, one of ordinary skill would hardly have gleaned any motivation to vary the molar ratios within the claimed limitations based on general teachings regarding copolymers.

On the other hand, if the Office Action is relying on an assertion that the illustrative examples of Blunt fairly teach molar ratios of the ethylene component to the α-olefin component, then the Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings. See Ex parte Clapp, 277 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). But Even if such an extrapolation is provided, Applicants rebut the presumption with evidence of unexpectedly improved low-temperature heat-sealing properties.

As shown in Comparative Example 1 of the present specification, the low-temperature heat-sealing property of modified ethylene/1-butene copolymer that do not contain the presently claimed molar ratios is clearly inferior to those of the presently claimed modified copolymer.

For example, Table 1 on page 103 of the specification clearly shows that copolymers not within the presently claimed

molar ratios demonstrated inferior heat sealing properties expressed as g/15 mm. At 100 °C, the low temperature sealing property for Comparative Example 1 is only 50 g/15mm whereas the presently claimed Example 1 has an almost 500% increase of 250 g/15mm. Clearly, one of ordinary skill in the art would not have been motivated to make the claimed molar ranges to improve low-temperature heat-sealing property based on a general copolymer teaching such as Blunt.

In addition, Blunt fails to expressly teach a crystallinity as measured by X-ray diffractometry of less than 30% recited in feature (c) of the independent claims. Blunt also fails to inherently teach the claimed limitation. In particular, Example 1-4 all contain a crystallinity ranging from 40 to 53% with no indication as to the desirability of having a crystallinity of less than 30%.

By way of background, Applicants note that the crystallinity of ethylene polymer is determined from the crystallinity of ethylene homopolymer (C_{homo}), the heat fusion (ΔH) of a sample (*i.e.* ethylene polymer), and the heat fusion of ethylene homopolymer (ΔH_{homo}) by the following formula:

$$\text{Crystallinity (\%)} = C_{homo} \times \frac{\Delta H}{\Delta H_{homo}}$$

wherein C_{homo} depends on an analytical method relying on well known data. Table 4.6 which is extracted from "Basis of Polymer Chemistry (page 183)" edit. by Polymer Association of Japan, and published from Tokyo Kagaku Doujin Ltd., on November 1978 (first edit) and originally in Japanese has been translated into English and provided herein as Table 4.6.

Table 4.6 Crystallinity of polyethylene, polyethyleneterephthalate

Sample		Density method/%	X-Ray diffraction/%	Infrared spectrum/%
Polyethylene	Phillips method	73	74	72
	Ziegler method (a)	77	78	76
	Ziegler method (b)	66	68	65
	High pressure (a)	55	57	53
	High pressure (b)	43	45	45
Polyethylene-terephthalate	1	20	29	61
	2	18	31	41
	3	18	0	50
	4	42	27	58
	5	56	39	81
	6	61	40	75

As is apparent from the description, Example 1 of Blunt is a polymer is prepared by a Ziegler method. Because the presently claimed invention recites crystallinity measured by X-Ray diffractometry, Applicants used data from the X-Ray diffraction column of Table 4.6. Accordingly, crystallinity of ethylene homopolymer (C_{homo}) used for the calculation should be 78% or 68%. However, the lower value of 68% is used for C_{homo}

because the presently claimed invention relates to low crystallinity of less than 30%.

Turning to Example 1 of Blunt, heat fusion (ΔH) was 30 calories/gram (col. 8, line 73) and heat fusion of ethylene homopolymer (ΔH_{homo}) was 38.3 calories/gram (col. 9, lines 1-2). Thus, the crystallinity of the copolymer produced in Example 1 of Blunt is calculated by the following formula:

$$\text{Crystallinity (\%)} = C_{homo}(68\%) \times \frac{\Delta H(30)}{\Delta H_{homo}(38.3)} = \mathbf{53.8\%}$$

Similarly, Examples 2-4 are calculated, and results are:

Example 2: ΔH = 27.6, crystallinity = **49%**

Example 3: ΔH = 25.7, crystallinity = **45.6%**

Example 4: ΔH = 22.7, crystallinity = **40.3%**

Applicants that even if the copolymers disclosed in Blunt are graft modified, the resulting modified product would not satisfy requisite (c) of the present invention because the crystallinity of graft-modified polymers do not vary a great deal from those of unmodified product. See page 100, line 17 and page 101, line 16 of the specification.

Accordingly, Blunt fails to expressly or inherently teach or motivate one of ordinary skill to make the presently claimed limitations with regard to crystallinity.

Regarding graft modification of the polymer product, Blunt is completely silent as to feature (d) of the presently claimed invention.

The secondary references also fail to teach any of these limitations. Roberts only discloses a reaction of a polymer having ethylenically unsaturated bond with a chain-transfer agent in the presence of a free radical while Tomita solely discloses a functionalized polymer obtained by oxidation or sulfonation of terminal double bond, or by addition reaction of functional group containing compound to double bond. Further, the unmodified polymer of Tomita is C_{3-20}-α-olefin polymer whereas the present invention relates to the completely different ethylene/α-olefin copolymer. Clearly, both these references fail to teach each and every claimed limitation of the presently claimed invention.

Accordingly, Applicants respectfully submit that the presently claimed invention is non-obvious over Blunt in view of either Roberts et al. or Tomita et al. and respectfully request

reconsideration and withdrawal of the rejections of claims 1-14 under 35 U.S.C. §103.

2. **Rejection of Claims 7 and 11 under 35 U.S.C. §112, 2nd paragraph**

The Office Action rejects claims 7 and 11 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. The Office Action then provides suggestion to remedy the situation.

Applicants respectfully traverse the rejection. However, for the sole purpose of advancing prosecution Applicants have amended claims 7 and 11 according to the Examiner's suggestions.

Claim 7 has been amended to remove the word "and" and instead inserted after the term "dl/g".

Claim 11 has similarly been amended to remove the word "and" and instead inserted after the term "dl/g". Additionally, the term "0.1 to 15% by weight of" has been added in line 3 as well as deletion of the phrase contained within the parenthetical "and . . . monomer" in lines 15-18.

Accordingly, Applicants respectfully submit that presently

pending claims 7 and 11 are definite and request the Examiner to reconsider and remove the rejection.

CONCLUSION

In light of the foregoing, Applicants submit that the application is now in condition for allowance. The Examiner is therefore respectfully requested to reconsider and withdraw the rejection of the pending claims and allow the pending claims. Favorable action with an early allowance of the claims pending is earnestly solicited.

Respectfully submitted,

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ATTORNEY'S DOCKET ZU-392
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:	)	
	)	Group Art Unit: 1733
TOKITA; SAITO	)	
	)	Examiner: Gallagher, John J.
Serial No. 09/601,893	)	
	)	
Filed: August 9, 2000	)	

For: **RESIN DISPERSION, METHOD OF PREPARING THE SAME, RESIN-COATED METAL SHEET OBTAINED WITH THE SAME, AND PROCESS FOR PRODUCING LAMINATE**

Appendix A

Please amend the claims according to the proposed revision to 37 C.F.R. §1.121 concerning a manner for making claim amendments.

B1

1. (Previously amended) A resin dispersion comprising solid particles of a graft modified ethylene/α-olefin random copolymer dispersed in an organic solvent, wherein the graft modified ethylene/α-olefin random copolymer has the following properties:

(a) the copolymer contains components derived from ethylene and an α-olefin of 6 to 20 carbon atoms, the content of the ethylene component is in the range of 75 to 97% by mol, and the content of the α-olefin component is in the range of 3 to 25% by mol, each content being based on 100% by mol of the total of both components,

(b) the intrinsic viscosity (η) as measured in decalin at 135°C is in the range of 0.2 to 5.0 dl/g,

(c) the crystallinity as measured by X-ray diffractometry is less than 30%, and

(d) the copolymer contains a graft component derived from a polar monomer, and the content of the polar monomer graft component is in the range of 0.1 to 15% by weight.

2. (Previously amended) The resin dispersion as claimed in claim 1, wherein the graft modified ethylene/α-olefin random copolymer further has a glass transition temperature (Tg) of not higher than -40°C and a molecular weight distribution (Mw/Mn) measured by GPC of not more than 3.

3. (Original) The resin dispersion as claimed in claim 2, wherein the graft modified ethylene/α-olefin random copolymer further has the following properties:

(f) the B value as calculated from the following equation is in the range of 1.0 to 1.4:

B value = POE/(2PO·PE)

wherein POE, 2PO and PE are each a parameter determined from the ^{13}C-NMR spectrum, PE and PO are a molar fraction of ethylene and a molar fraction of the α-olefin, respectively, to the total number of moles of the ethylene component and the α-olefin contained in the modified ethylene/α-olefin random copolymer, and

POE is a proportion of the number of ethylene/α-olefin alternating sequences to the number of all dyad sequences.

4. (Previously amended) The resin dispersion as claimed in claim 1, wherein the dispersed solid particles of the modified ethylene/α-olefin random copolymer have particle diameters measured by a Coulter Counter of 1 to 50 μm.

B1

5. (Original) The resin dispersion as claimed in claim 1, wherein the solid concentration of the resin dispersion is in the range of 3 to 50% by weight.

6. (Original) The resin dispersion as claimed in claim 1, wherein the ethylene/α-olefin random copolymer has been prepared by the use of a metallocene catalyst.

B1

7. (Currently amended) A process for preparing a resin dispersion, comprising grafting a polar monomer on an unmodified ethylene/α-olefin random copolymer having the following properties:

(a') the copolymer contains components derived from ethylene and an α-olefin of 6 to 20 carbon atoms, the content of the ethylene component is in the range of 75 to 97% by mol, and the

content of the α-olefin component is in the range of 3 to 25% by mol, each content being based on 100% by mol of the total of both components,

B1 (b') the intrinsic viscosity (η) as measured in decalin at 135°C is in the range of 0.2 to 5.0 dl/g, and

(c') the crystallinity as measured by X-ray diffractometry is less than 30%, ~~and~~

to prepare a graft modified ethylene/α-olefin random copolymer containing 0.1 to 15% by weight of a graft component derived from the polar monomer, and then dispersing solid particles of the graft modified copolymer in an organic solvent.

8. (Previously amended) The process for preparing a resin dispersion as claimed in claim 7, wherein the unmodified ethylene/α-olefin random copolymer further has a glass transition temperature (Tg) of not higher than -40°C and a molecular weight distribution (Mw/Mn) measured by GPC of not more than 3.

9. (Original) The process for preparing a resin dispersion as claimed in claim 8, wherein the unmodified ethylene/α-olefin random copolymer further has the following properties:

(f') the B value as calculated from the following equation is in the range of 1.0 to 1.4:

B value = POE/(2PO·PE)

wherein POE, 2PO and PE are each a parameter determined from the ^{13}C-NMR spectrum, PE and PO are a molar fraction of ethylene and a molar fraction of the α-olefin, respectively, to the total number of moles of the ethylene component and the α-olefin contained in the modified ethylene/α-olefin random copolymer, and POE is a proportion of the number of ethylene/α-olefin alternating sequences to the number of all dyad sequences.

B1

10. (Original) The process for preparing a resin dispersion as claimed in claim 9, wherein the unmodified ethylene/α-olefin random copolymer is a linear ethylene/α-olefin random copolymer having the following properties:

(g') the ratio (gη* (=(η)/(η)blank) of the intrinsic viscosity (η) measured as the property (b') to the intrinsic viscosity (η) blank of a linear ethylene/propylene copolymer having the same weight-average molecular weight (by light scattering method) as that of the unmodified ethylene/α-olefin random copolymer and having an ethylene content of 70% by mol is a value exceeding 0.95.

B2

11. (Currently amended) The process for preparing a resin dispersion as claimed in claim 7,wherein the resin dispersion

comprises a 0.1 to 15% by weight of polar monomer grafted to an unmodified ethylene/α-olefin random copolymer having the following properties:

(a') the copolymer contains components derived from ethylene and an α-olefin of 6 to 20 carbon atoms, the content of the ethylene component is in the range of 75 to 97% by mol, and the content of the α-olefin component is in the range of 3 to 25% by mol, each content being based on 100% by mol of the total of both components,

(b') the intrinsic viscosity (η) as measured in decalin at 135°C is in the range of 0.2 to 5.0 dl/g, and

(c') the crystallinity as measured by X-ray diffractometry is less than 30%, ~~and~~

~~to prepare a graft modified ethylene/α-olefin random copolymer containing 0.1 to 15% by weight of a graft component derived from the polar monomer,~~ and then dispersing solid particles of the graft modified copolymer in an organic solvent.

12. (Original) A process for producing a resin-coated metal plate, comprising applying the resin dispersion of claim 1 to a metal plate to form a coating film.

13. (Original) The process for producing a resin-coated

metal plate as claimed in claim 12, wherein a finish coating is applied to the coating film to form a finish layer.

14. (Original) A process for producing a laminate, comprising applying the resin dispersion of claim 1 to a metal plate to form an adhesive layer and laminating a polyolefin sheet or film on the metal plate by means of the adhesive layer.

15. (New) The resin dispersion as claimed in claim 1, wherein the polar monomer is maleic anhydride.

16. (New) The process for preparing a resin dispersion as claimed in claim 7, wherein the polar monomer is maleic anhydride.